

repaint! repaint - but when?

The role of paint is a combination of protection and beautification, applied, as it is, on trillions of dollars' worth of assets. The vast majority of the paints used on and within our built environment are based on organic chemistry which will slowly degrade over time under the combined influences of oxygen, ozone, electromagnetic radiation (U.V, light and heat), water, hail and ice, bacteria, fungi, algae, old Uncle Tom Cobby and all!

Two questions are inevitably asked

- 1) How long will my paint last? And more reasonably
- 2) When will I know when my paint needs recoating?

In trying to answer the first question, chemistry obviously plays a major role. Polystyrene self-destructively absorbs U.V. light while poly methyl methacrylate (Perspex) is passive to it. Thus, paints based on styrene acrylics, used outside, will always fail earlier than similar paints based on pure acrylics. Pinks, shaded with toluidine red will fade orders of magnitude faster than similar shades achieved by the use of red iron oxide.

Substrate also plays an important role depending on both physical and chemical stability. A fresh, highly alkaline concrete surface can interfere with the chemistry of the paint and its film formation, quite unlike an inert, kiln-fired brick. Heat speeds up chemical reactions and a heat absorbing substrate will degrade a topcoat faster than will a heat reflecting one. Our studies also show that dark colours based on CoolColour technology outperform 'standard' technology.

And then there is the application technique – and the weather!

Waterborne paint consists of a suspension of billions of different particles each type with their own idiosyncratic surfaces and stabilising systems. While an acceptable degree of metastability is achieved in the can, things become much more random during the drying process. While it is nice to think that this process would proceed in a controlled fashion through to a uniformly distributed, well-integrated film, the fact is that ambient temperature and the rate of removal of water can have a profound effect on film formation. The same paint, applied over a porous substrate on a hot,

breezy day with a low relative humidity will end up with a differently structured film than if it were applied over a sealed substrate, on a still humid day, with a low ambient temperature approaching the glass transition temperature of the polymer.

Studies carried out in Europe confirmed these influences on the final durability of paint systems.

So, how long will your paint last?

I just don't know. I couldn't even pick it on my own home! About 80 metres east of our eastern wall there is a ridge about 20-25 metres high, topped with mature radiata pines such that by the time the sun rises over them, it would already have about 30 degrees elevation and a fair bit of 'sting' in it. The weatherboard wall has, unusually, a 150mm stud, insulated using R22 fibreglass batts ex Canada. A fair bit of dew accumulates on it which is still there when the fairly strong sun heats it. The wall steams, with the already hot sun, U.V. and the water vapour combining to prematurely degrade the paint.

And a kicker! On the inside of this well insulated wall sits an AGA range, the outline of which can be seen on the outside in an area of less degradation! Obviously some heat is leaking through reducing the amount of condensation.

So when will you know when it is time to maintain or renew your paint? This is highly dependent on whether one's priority leans to the functional or to the aesthetic.

Where the functional is concerned, there is often a clear set of self-evident parameters. If barnacles are growing on the bottom of your boat, you can be sure that your antifouling is in need of replacement. Similarly anticorrosive systems have defined inspection intervals and pre-agreed photographic standards. I could go on!

Of greater subtlety is the question of when a white, low sheen-finish, general purpose decorative/protective coating needs replacing? Such a paint will be composed of an organic binder with inorganic pigments. These pigments will not, in themselves, degrade but they may aggravate the degradation of the binder. Depending on its chemistry, the binder will degrade due to some of the aggressors named above. The degradation will result in a loss of the binder

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initially manifesting in a loss of gloss. Binder will continue to erode until there is insufficient to hold the pigmentation in place which then becomes loose on the surface. This phenomenon, known as 'chalking' becomes readily evident when brushing against it while wearing a clean, dark suit.

Although tempting to see this as just a surface effect, the loss of binder occurs throughout the film, altering the pigment/binder ratio with a resulting loss of physical properties. Water will begin penetrating into the film rather than simply spread over the surface.

In my opinion, the initial onset of 'chalking' is the signal for immediate remedial action. Chalking, of course, is never uniform, always occurring first on the most exposed areas. South facing aspects virtually never chalk. These aspects probably will only need washing rather than repainting.

Aesthetics are always in the eye of the beholder, and while some loss of gloss or change of shade may well get up

someone's nose, they rarely affect the protective qualities. Colours change due to molecular realignments in the coloured pigment's chromophores, or by the development of minute vesicles within the film, leading to slight milkiness – a milkiness which is more obvious the darker the original colour was. There is some debate as to the exact reason and nature of this phenomenon; for myself, I believe that it is the degradation of microscopic 'clusters' of dehydrated surfactants, thickeners and other moieties within the film. Whatever, the fact is that the phenomenon is rarely uniform and always looks slightly patchy!

When it comes to interiors, apart from fixing obvious damage, the main catalyst for repaints is aesthetics.

My recommendation, as a technical sort, would be to paint everything white but while that might help the paint, we'd need permanent sunglasses to deal with the glare!



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